

DRAFT

**FISH AND WILDLIFE COORDINATION ACT REPORT
LOWER MUD RIVER FLOOD CONTROL PROJECT**

March, 2003

Prepared by the U.S. Fish and Wildlife Service
West Virginia Field Office

EXECUTIVE SUMMARY

The Town of Milton is located along the Lower Mud River in Cabell County, West Virginia (WV). Milton is subject to periodic flood damages as a result of natural and man-made factors. In 1992, the Natural Resources Conservation Service (NRCS) conducted an evaluation of flood control measures that could be used in the Lower Mud River Watershed. The Corps of Engineers, Huntington District (Corps) has been authorized to reevaluate the NRCS's proposed project, and construct a project that would alleviate flood damages in Milton.

The Corps has developed six feasible alternatives that would address these impacts. These alternatives fall into two major categories: 1.) alternatives would consist of a levee placed along the north side of the Mud River; and 2.) alternatives that would consist of a levee along the north side of the river and would also require relocation of approximately 3,225 feet of the Mud River. Three alternatives within each major category were developed. These alternatives differ in the level of flood protection that would be provided to the town.

The U.S. Fish and Wildlife Service (Service) cooperated with the West Virginia Division of Natural Resources (WVDNR) and the Corps to conduct an evaluation of habitats within the project area. Bottomland Hardwood, Urban, Mixed Hardwood, Open Agricultural, Early Oldfield, jurisdictional and non-jurisdictional wetlands, streams, and riverine habitats were identified within the project area. These habitat types each support numerous fish and wildlife resources. Summer habitat for the federally endangered Indiana bat (*Myotis sodalis*) may also occur within the project area. Mist net surveys should be conducted in order to determine if this species is present within the project area. Additional consultation under the Endangered Species Act would be required if any Indiana bats are found.

Alternative D, the Low Level Levee Only Alternative, would minimize impacts to terrestrial habitats and avoid impacts to aquatic habitats to the maximum extent possible. Mitigation for remaining unavoidable impacts could be achieved primarily using on-site, in-kind mitigation on lands already being acquired for the primary project purpose. The Service would support selection of this alternative. Alternative E, the Medium Level Levee Only Alternative would have slightly greater adverse impacts to terrestrial resources, but would still avoid impacts to aquatic resources, including Waters of the United States. Adequate mitigation to address any increased terrestrial impacts could be developed. The Service would not object to the selection of this alternative.

All of the Channel Relocation Alternatives would have greater impacts to all terrestrial and aquatic habitat types within the project area, including Waters of the United States. One of the major differences between the Channel Relocation Alternatives and the Levee Only Alternatives is the impact associated with relocating the Mud River. Developing mitigation options for impacts to the Mud River would be complex and would entail significant cost. Adequate mitigation options may not be available or may require additional off-site effort. Clean Water Act regulations and existing Service policies specify that alternatives that impact Waters of the United States should not be selected if feasible alternatives exist that would avoid those impacts. The Service therefore strongly recommends against selection of any of these alternatives. The Draft Coordination Act Report (DCAR) makes recommendations on measures that could be

used to avoid, minimize and mitigate for potential project impacts under all alternatives. Excess land within the Construction Work Limits, as well as selected adjacent habitats could be preserved and enhanced. The Corps should coordinate with the Service and the WVDNR once an acceptable project alternative is selected to develop a conceptual mitigation plan that incorporates the recommendations made in this report. This DCAR is based on the project information that was available as of March 5, 2003. The information presented in this report may be revised for the final CAR due to project alterations or receipt of additional project data. If any part of the described plans change, the Service will need to re-evaluate the impacts and modify our mitigation recommendations accordingly.

TABLE OF CONTENTS

ACKNOWLEDGMENTS	3
INTRODUCTION	3
DISCUSSION OF PREVIOUS STUDIES.....	4
DESCRIPTION OF ALTERNATIVES.....	5
HABITAT EVALUATION PROCEDURES	7
FISH AND WILDLIFE RESOURCES IN THE STUDY AREA	9
BASELINE FUTURE WITHOUT PROJECT ASSESSMENT	14
DESCRIPTION OF IMPACTS AND COMPARISON OF ALTERNATIVES	15
RECOMMENDED CONSERVATION, ENHANCEMENT, AND MITIGATION MEASURES	19
SUMMARY OF FINDINGS AND SERVICE POSITION.....	24

Figures and Tables:

Table 1: Some Primary Characteristics of the Feasible Alternatives	6
Table 2: Results of Modified HEP	8
Table 3: Comparison of Alternatives and Recommended Mitigation	15

Figure 1: Alternative B – High Level Levee with Channel Relocation

Figure 2: Alternative D – Low Level Levee Only

Figure 3: Habitat Map Showing Locations of HEP Evaluation Sites

Appendix I: Supporting Information for HEP Analysis

Calculation of Impacts and Habitat Units by HEP Site

Notes on HEP Rating Rationales

ACKNOWLEDGMENTS

Chris Carson of the Huntington District, Corps of Engineers made significant contributions towards this report by preparing all the habitat impact maps. Randy Kelley of the West Virginia Division of Natural Resources and Barry Passmore of the Huntington District, Corps of Engineers cooperated in conducting the habitat evaluation effort.

INTRODUCTION

The headwaters of the Mud River are located in Boone County, WV at an elevation of 1,700 feet above Mean Sea Level (MSL). The river flows for 58.5 miles in a generally northwest direction to the confluence with Guyandotte River at elevation of 515 feet above MSL. The drainage area of Lower Mud River Watershed is 168,740 acres or 263.7 square miles, and includes the area from the confluence with Guyandotte River in Barboursville, WV to the confluence of the Middle Fork of the Mud River at Hamlin, WV. The Town of Milton, WV is located in Cabell County, along the Mud River, 19.4 miles up river from the confluence with the Guyandotte River. According to the 2000 Census, Milton has a population of 2,206 people.

Like many towns in the state, Milton is located at least partially within the floodplain of a river, and is therefore subject to periodic flooding. Significant flooding events in the town occurred in 1913, 1939, 1962, 1978, and 1997, which is the flood of record. However, the extent of recent flood damages within Milton are not entirely due to natural causes. Flood levels in the town have increased since the construction of the U.S. Route 60 and Interstate 64 highway bridges in the 1960's. These bridges are located 1.7 and 2.2 miles, respectively, downstream of the town. These bridges were elevated across the floodplain on long fills, which have reduced the out-of-bank flood area of the Mud River by about 75 percent. As a result, fills from the bridges act like dams causing increased flood stages upstream, including within the Town of Milton. (NRCS, 1992).

The floodplain has also been filled for development within the town. For example, Milton Plaza was recently constructed over an area that was at least partially filled. In addition, the area around Johns Branch, a small tributary of the Mud River that flows through Milton, has recently been filled and developed. This type of practice has occurred in other locations in town. While the effect of this type of activity has not been quantified, it may exasperate the town's already existing flood problems.

In May, 1992, the U.S. Department of Agriculture, Soil Conservation Service (now the NRCS) prepared an Environmental Impact Statement (EIS) under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1009, et.seq). This EIS evaluated the feasibility of undertaking flood control measures within the Lower Mud River Watershed. The only area within the watershed where flood control measures were determined to be economically feasible was within the Town of Milton.

Section 580 of the Water Resources Development Act (WRDA) of 1996 authorized the Corps to

conduct a limited reevaluation of the watershed plan and EIS prepared by the NRCS. Section 340 of the WRDA of 2000, further modified that authority and authorized the Corps to construct the project as selected in the reevaluation report.

This DCAR has been prepared pursuant to the Fish and Wildlife Coordination Act (16 U.S.C. 661-667e) and is consistent with the Service's authorities under the Migratory Bird Treaty Act (16 U.S.C. 703-712) and the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) (ESA). The recommendations and information provided in this DCAR are derived primarily from the reports as listed below. Mitigation recommendations are based where possible on Habitat Evaluation Procedure (HEP) and/or the Service's established mitigation policies. Where this is not possible or practicable, best professional judgement, under consultation with the biologists from the WVDNR, and the Corps has been used.

DISCUSSION OF PREVIOUS STUDIES

The Lower Mud River Watershed, Watershed Plan and Environmental Impact Statement was produced by the NRCS in May, 1992 and was amended in October, 1994. The plan that was recommended in that EIS consisted of 11,750 feet of channel work and 1,640 feet of overland floodway. Under the NRCS's proposed plan, channel work would consist of widening the existing Mud River channel to 80-feet wide, and lining the channel bottom and sides with riprap. The constructed channel would be on average 20-feet deep and 160-feet wide. Channel work would begin behind the existing trailer park and extend to the I-64 bridge. The overland floodway would start just after the I-64 bridge and extend downstream. The floodway would be 50-feet wide at the bottom and be on average 6-feet deep. The resource agencies, including the Service, the WVDNR, and the U.S. Environmental Protection Agency (USEPA), all expressed significant concerns regarding the NRCS's selected alternative. The resource agencies felt that less damaging alternatives were available, that inadequate or incomplete alternatives analyses and environmental reviews were conducted, that significant water quality impacts would result, and that the proposed mitigation plan was not enforceable or appropriate to the anticipated impacts. As described above, the Corps has been authorized to reevaluate the feasibility of that proposed project, and develop new alternatives as appropriate.

As part of the Scoping Process for the Reevaluation Report, the Corps contracted with Marshall University to conduct biological recognizance reports for the project area. Three reports were produced as a result of that effort:

2. Habitat Assessment and Associated Amphibians, Reptiles, and Birds at the Sites of Proposed Mud River Alterations, Milton, West Virginia (Dr. Thomas Pauley);
2. Flora and Vegetation of Selected Plant Communities at the Proposed Mud River Project, Milton, West Virginia (Dr. Dan K. Evans); and
3. Mud River Aquatic Assessment Report (Drs. Tom Jones & Ralph Taylor).

These reports provided useful information in regards to the species of flora and fauna that could be expected within the project area. Draft copies of these reports were provided in October, 2002. Additional field work in conjunction with these efforts may occur in Spring, 2003 and final reports should subsequently become available.

The Corps also contracted with Burgess & Niple to prepare a Wetland Delineation Report for the Lower Mud River Project. This report was submitted in February, 2003.

The information contained in these reports has been incorporated into this DCAR as appropriate.

DESCRIPTION OF ALTERNATIVES

Based on the information provided to date, the Corps has determined that the NRCS' proposed channel work alternative, as described in the above, and a full river diversion alternative were unfeasible. These alternatives will not be fully evaluated in the draft EIS. The full river diversion alternative would divert the Mud River into an entirely new channel south of the Town of Milton. Both the NRCS's alternative and the full river diversion alternative would significantly alter or eliminate the existing Mud River throughout the project area and would therefore, have increased environmental impacts compared to the feasible alternatives that have been developed. As a result, the Service does not object to the elimination of these alternatives from full consideration.

All of the Corps' feasible alternatives fall into two main categories: 1) levee alternatives requiring channel relocation; and 2) levee only alternatives that do not require any channel relocation. All the feasible alternatives are primarily composed of a levee that generally runs along the north bank of the Mud River through the Town of Milton.

Within these two main categories of alternatives the Corps has developed three alternative variations. The alternative variations provide differing levels of flood protection to the town. While the downstream terminus of the levee is the same for all variations, the upstream terminus has been altered in order to tie in to the appropriate elevation required to provide the desired level of flood protection. Minor changes in levee alignment have also been made to accommodate the required footprint of the levee for each variation. The variations also differ in the size and location of pumping stations required to eliminate ponding from drainage internal to the levee. Generally as the level of flood protection provided is increased, the height, width, and length of the levee as well as the amount of borrow material needed is increased. As a result, the variations that provide the greatest level of flood protection can also be expected to cause the greatest level of environmental impact. An overview of some of the major characteristics of each alternative is provided in Table 1.

Table 1: Some Primary Characteristics of the Feasible Alternatives

Alternative	LOP	Footprint (acres)	Length (ft)	Avg. Width at Base (ft)
Alternatives Requiring Channel Relocation				
A: Medium Level Levee w/ Channel	100 yr.	17	7,922	92
B: High Level Levee w/ Channel	250 yr.	21.5	8,312	105
C: Very High Level Levee w/ Channel	500 yr.	26	8,160	112
Alternatives that do not Require any Channel Relocation				
D: Low Level Levee Only	20 yr.	9	6,672	57
E: Medium Level Levee Only	100 yr.	15	8,416	78
F: Very high Level Levee Only	500 yr.	19	8,680	96

LOP - Level of Protection

The levee that follows a similar alignment in the lower half of the project area, downstream of Mud River Road, in all the alternatives. The primary differences between the two groups of alternatives occur in the upstream half of the project area. The levee alternatives that do not require any channel relocation would travel to the south of Milton Plaza and then essentially run parallel to the north bank of the Mud River up to Mud River Road.

The levee alternatives requiring channel relocation would consist of a levee that travels south of Milton Plaza and would then cross the existing Mud River and travel south of the existing river through the areas currently used for the pumpkin festival. The levee would again cross the existing Mud River just upstream of Mud River Road. For these alternatives, the reach of the existing Mud River that would then be north of the proposed levee would be excavated into a 13.3 acre ponding area for Johns Branch. An associated pumping station would be built to pump the ponded water across the levee and into the river. These alternatives would also require that approximately 2,920 feet of new channel for the Mud River be constructed in order to replace the 3,225 feet of existing channel that would be lost. It is proposed that the new channel would be constructed using natural stream channel design techniques.

Downstream of Mud River Road the levee for all alternatives would follow a westerly alignment paralleling the northern embankment of the Mud River. It would then turn southwest, cross over an existing go-cart track and the old covered bridge approach, turn westerly again to follow the northern bank of the river, then move away from the bank and tie into high ground at the western side of Abbott Street.

Figures 1 and 2 show a proposed levee alternative requiring channel relocation, and a levee only alternative, respectively. For ease of analysis, this DCAR will focus on quantifying the impacts of only one alternative from each major category. Qualitative comparisons will then be made between the other alternatives within each group. Alternative B has been selected as representative of the Levee with Channel Relocation alternatives, while Alternative D has been

selected for Levee alternatives without Channel Relocation. Preliminary information from the Corps suggests that these two alternatives provide the greatest economic benefits within each respective category.

HABITAT EVALUATION PROCEDURES

A Modified HEP for the project area was conducted on January 14 & 15, 2003. Participants were Randy Kelley of the WVDNR, Barry Passmore of the Corps, and Barbara Douglas of the Service. Habitat maps were made by utilizing United States Geologic Survey (USGS) 1 meter color infrared digital orthophoto quarterquads. The imagery was acquired by the USGS in 1996 and 1997. Habitat types were separated using spectral differentials, one foot contour topographic mapping, soil survey mapping and field data/observations. The data was analyzed and generated using Geographic Information System (GIS) applications. The mapping effort was conducted by Chris Carson of the Corps. After initial mapping was complete, the team field verified the habitat delineations, and made alterations based on consensus of appropriate habitat descriptions.

The following terrestrial habitat types were identified within the project area: bottomland hardwoods, urban, mixed hardwoods, open agricultural, and early oldfield. Wetlands, streams and riverine and open water habitat types were also present within the project area. The team identified a number of unique habitat areas that although not classified as jurisdictional wetlands, were felt to provide many of the same functions and values, or were worthy of special consideration. While these areas were not all rated, they were noted by the team for additional consideration. In addition, RAPID Bioassessment Protocol Ratings were given to portions of the Mud River during Marshall Universities' recognizance study and further quantification of these areas will occur prior to the Final EIS. Impacts to wetlands, streams, and riverine habitat are regulated by the Clean Water Act,

For a Modified HEP, habitat was rated on its overall suitability to support all wildlife which would be expected to use each cover type, and no evaluation species were selected. A subjective value of one to ten was assessed on the suitability of the habitat to provide food, cover, and reproduction requirements for wildlife species that would be expected to use that habitat type. Prior to rating each sample area, the team discussed components of each habitat type that would be evaluated when determining ratings. For example, ratings for bottomland hardwood areas would be based on the presence of snags, mast production, estimated average Diameter at Breast Height (DBH) of existing trees, proximity to water, and the size of the area. A value of 10 reflects optimum suitability for that habitat type in the region. Final rating for each area was determined by averaging the ratings of all team members. Since different criteria are used to rate each habitat type, ratings should only be used to compare sample sites within the same habitat type (e.g. a HSI of 10 for a Bottomland Hardwood sites is not the same as a 10 for an Open Agricultural site). While this approach is based on the professional judgement of the team members and is therefore, ultimately subjective, it's value is based on the consensus of all parties involved.

Because habitat quality varies along the length of the river, the team decided to individually rate specific impact areas rather than obtaining an average HEP value for each habitat type in the

project area. A total of 14 sample sites were selected, including 5 bottomland hardwood areas, 4 open agricultural sites, 2 sites in Urban habitat, and 1 site each for early oldfield, mixed hardwood, and open water habitats. The number of sites selected for each habitat type was based on the perceived diversity of habitat quality within the project area. Figure 3 shows the locations of the HEP sample points. This approach will allow for a more accurate comparison of which project alternative will have the most adverse effects to high quality habitat and potentially allow for project modifications so that impacts to these areas are avoided to the extent practicable. It is anticipated that additional HEP work will be conducted prior to the Final EIS. Table 2 shows the results of the Modified HEP.

TABLE 2: Results of Modified HEP

Site #	Habitat Type	Location Description	HSI RATING			Avg. Rating
			WVDNR	USACE	USFWS	
1	Urban	Behind Gino's - Milton Plaza	5	6	5	5.3
2	Bottomland Hardwood	Behind Milton Plaza	6	5	5	5.3
3	Bottomland Hardwood	Behind Stratton Tractors across from the waste water treatment plant	6.5	6	6	6.2
4	Urban	Near Wayne's Heating & Airforce plane statute	6	5	6	5.7
5	Bottomland Hardwood - Imm.	Small tributary between Middle School & Wayne's Heating	4	6	4	4.7
6	Open/Agricultural	Behind Middle School	8	8	7	7.7
7	Bottomland Hardwood	RDB just SW of junk area - includes both sides of bank	8	6.5	8	7.5
8	Open/Agricultural	Farthest downstream end of project	8.5	8.5	9	8.7
9	Early Oldfield	South side of river behind Highlawn Ave.	8	8	8	8.0
10	Open/Agricultural	Pumpkin festival area	6	6	6	6.0
11	Bottomland Hardwood	Behind pumpkin festival area	8	7	7.5	7.5
12	Open/Agricultural	Top of knoll near pumpkin festival area	7	6.5	5	6.2
13	Mixed Hardwood	Side of knoll behind pumpkin festival area	7	6.5	5	6.2
14	Open Water	East of Milton Plaza	8	6	7	7.0

FISH AND WILDLIFE RESOURCES IN THE STUDY AREA

Bottomland Hardwood: Most of riparian areas within the project area can be characterized as bottomland hardwood (BH) habitat. This habitat type generally occurs in low lying areas that are subject to soil saturation and repeated flooding. When minimally disturbed, mature stands typically have a four-layered canopy structure with canopy, sub-canopy, shrub, and herbaceous ground-cover layers. Common overstory species include silver maple (*Acer saccharinum*), sycamore (*Platanus occidentalis*), catalpa (*Catalpa speciosa*), black walnut (*Juglans nigra*), tulip poplar (*Liriodendron tulipifera*), slippery elm (*Ulmus rubra*), and river birch (*Betula nigra*). Sub-canopy species include box elder (*Acer negundo*), and saplings of the overstory species. Species such as elderberry (*Sambucus nigra*), spicebush (*Lindera benzoin*), and black willow (*Salix nigra*) may be common in the shrub layer, while the herb layer includes maiden hair fern (*Adiantum pedatum*), jewelweeds (*Impatiens capensis*), smartweeds (*Polygonum pensylvanicum*), and hog peanut (*Amphicarpaea bracteata*).

This habitat type is the climax riparian community and is extremely productive in terms of wildlife use. BH habitats are used by muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), beaver (*Castor canadensis*), mink (*Mustela vison*), red fox (*Vulpes fulva*), gray squirrel (*Sciurus carolinensis*), and white-tailed deer (*Odocoileus virginiana*). Birds species commonly found include mallard (*Anas platyrhynchos*), wood duck (*Aix sponsa*), great blue heron (*Ardea herodias*), green-backed heron (*Butorides virescens*), belted kingfisher (*Megasceryle alcyon*), warbling vireo (*Vireo gilvus*), prothonotary warbler (*Protonotaria citrea*), and Louisiana waterthrush (*Seiurus motacilla*). Reptiles and amphibians may include midland mud salamander (*Pseudotriton montanus diastictus*), eastern American toad (*Bufo americanus americanus*), Fowler's toad (*Bufo fowleri*), eastern box turtle (*Terrapene carolina carolina*), common ribbon snake (*Thamnophis sauritus sauritus*), and northern rough green snake (*Opheodrys aestivus aestivus*).

Much of this habitat type within the project area has been subject to disturbances such as occasional cutting and clearing. As a result, fully mature stands are interspersed with areas of habitat that are in earlier stages of regrowth. While still supporting many of the same plant species, the canopy layer is not as dense, trees may not be as large, and a greater proportion of shrub and herb species are present. These areas may also not be utilized as heavily by wildlife.

Urban: The predominant characteristic of this habitat type is the presence of development throughout the area. Urban (Ur) habitat contains homes, businesses, shopping areas, schools, streets, parking lots, and some industrial facilities. Development may be interspersed with lawns, landscaping, shade trees, gardens, recreational parks, and limited undeveloped or open areas. The value of this habitat is highly dependent upon the diversity and type of development that is present. Generally, areas with low density development or that are predominantly residential will provide greater wildlife value than highly developed areas mainly consisting of pavement. Gray squirrel, raccoon, opossum (*Didelphis marsupialis*), slate-colored junco (*Junco hyemalis*), barn swallow (*Hirundo rustica*), American robin (*Turdus migratorius*), blue jay (*Cyanocitta cristata*), purple martin (*Progne subis*), grey catbird (*Dumetella carolinensis*),

cardinal (*Cardinalis cardinalis*) and various species of small mammals (*Peromyscus spp.*) may commonly be found in these areas. Much of the project area, particularly near Route 60, is of this habitat type.

Mixed Hardwoods: This habitat type is present in limited quantities near the termini of the project, adjacent to residential areas, and also along two tributaries north of the Mud River. Mixed Hardwoods (MH) in the project area contain trees such as oaks (*Quercus spp.*), black cherry (*Prunus serotina*), beech (*Fagus americana*), sassafras (*Sassafras albidum*), and white pine (*Pinus strobus*). The understory vegetation of herbs and shrubs commonly includes hornbeam (*Carpinus caroliniana*), flowering dogwood (*Cornus florida*), poison ivy (*Toxicodendron radicans*), spring beauty (*Claytonia virginica*), wood violets (*Viola spp.*), Christmas fern (*Polystichum acrostichoides*), briars (*Smilax spp.*), and trumpet creeper (*Campsis radicans*). Some wildlife species that may be found in this habitat type are gray squirrel, eastern chipmunk (*Tamias striatus*), eastern mole (*Scalopus aquaticus*), red-eyed vireo (*Vireo olivaceus*), scarlet tanager (*Piranga olivacea*), black and white warbler (*Mniotilta varia*), downy woodpecker (*Picoides pubescens*), white-tailed deer, eastern box turtle, and black rat snake (*Elaphe obsoleta obsoleta*).

Open Agricultural: Open Agricultural (OA) habitats within the project area are generally grass or hay fields that are mowed at least annually, or areas that are planted with crops. Corn appears to be the most common crop within the study area, although some areas appear to have been planted with tobacco in the past. This habitat type provides food, cover, and resting areas for wildlife species such as white-tailed deer, red-tailed hawk (*Buteo jamaicensis*), mourning dove (*Zenaidura macroura*), eastern bluebird (*Sialia sialis*), eastern meadowlark (*Sturnella magna*), killdeer (*Charadrius vociferus*), eastern garter snake (*Thamnophis sirtalis sirtalis*), and woodchuck (*Marmota monax*). In addition, these areas are heavily utilized by waterfowl species such as Canada goose (*Branta canadensis*), mallard, and black duck (*Anas rubripes*) during migration and over winter. While large expanses of cropped land may not be heavily utilized by wildlife, the value and utilization of OA habitats is greatly increased if they are surrounded by, or occur in close proximity, to other wetland, forested, or riverine habitat types.

Early Oldfield: Early Oldfield (EO) habitat is generally formed when open fields are let to lay fallow for a number of years. Through the process of succession many native species may begin to colonize the area. Virtually 100 or more annual and perennial plant species, including grasses, forbs, creepers, climbers, parasites, and composites can occur in this community. Species groups such as ragweeds (*Ambrosia spp.*), goldenrods (*Solidago spp.*), asters (*Aster spp.*), sunflowers (*Helianthus spp.*), coneflowers (*Rudbeckia spp.*), sneezeweed (*Helenium spp.*), ironweeds (*Vernonia spp.*), Joe-pye-weed (*Eupatorium perfoliatum*), nettles (*Urtica spp.*), trefoils (*Trifolium spp.*), primroses (*Primulaceae*), buckwheats (*Polygonaceae*), morning glories (*Ipomoea spp.*), bindweeds (*Convolvulus spp.*), brambles (*Rubus spp.*), and numerous others may form an almost impenetrable tangle of vegetation, sometimes rising to six feet or taller during the height of the growing season. During the winter months the dead vegetation usually forms a thick mat.

These areas are extremely valuable to numerous wildlife species, and provide food, cover,

nesting, and resting habitat for at least a portion of the life cycle of many migratory or resident wildlife species. Mammals such as the meadow vole (*Microtus pennsylvaticus*), short-tailed shrew (*Blarina brevicauda*), white-tailed deer, woodchuck, cottontail rabbit (*Sylvilagus floridanus*), muskrat, and others utilize these areas. The lush browse, insect fauna, fruits and seeds that are available during the spring, summer, and fall, provide important food items and cover for nearly all local wildlife species. Migratory and resident songbirds heavily utilize these areas during late summer and fall. Species commonly observed include song sparrow (*Melospiza melodia*), fox sparrow (*Passerella iliaca*), field sparrow (*Spizella pusilla*), common yellow throat (*Geothlypis trichas*), goldfinch (*Carduelis tristis*), Carolina chickadee (*Parus carolinensis*), tufted titmouse (*Parus bicolor*), rufous-sided towhee (*Pipilo erythrophthalmus*), and mourning dove. In addition, many reptile species such as black rat snake, eastern milk snake (*Lampropeltus triangulum triangulum*), hog-nosed snake (*Heterodon platirhinos*), eastern box turtle, common five-lined skink (*Eumeces fasciatus*), and northern fence lizard (*Sceloporus undulatus hyacinthinus*) may occur here.

Riverine Habitats: The Mud River is a warmwater, perennial stream that meanders along a relatively flat gradient of approximately 2 feet per mile through the project area. Due to this low gradient, velocities are typically slow in the river. Riffles are infrequent and the river is characterized by the presence of long pools. Consistent with its' name, substrates consist mostly of silts and sands, and turbidity tends to be high. A large amount of fallen timber and woody debris is present in the river, providing good cover and structural diversity. A small water supply dam is located approximately in the upper third of the project area. Depths upstream of the dam range from 10 to 15 feet deep in the mid-channel, while downstream of the dam and for most of the project area the channel is approximately 2 to 3 feet deep. Average width of the channel is approximately 60 feet.

Thirty-two species of fish were collected from the river during Marshall Universities' recognizance study, with northern hog-nosed sucker (*Hypentelium nigricans*), golden redhorse (*Moxostoma erythrurum*), and silverjaw minnow (*Ericymba buccata*) being the most common species. Other common species were creek chub (*Semotilus atromaculatus*), green sunfish (*Lepomis cyanellus*), spotted bass (*Micropterus punctulatus*), striped shiner (*Notropis chysiocephalus*), and brindled madtom (*Noturus miurus*). The WVDNR stocks the river with muskellunge (*Esox masquinongy*) fingerlings annually. Mussel species found within the project area are the three ridge (*Amblema plicata*), fat mucket (*Lampsilis siliquodina*), and Wabash pigtoe (*Fuscania flava*). Three additional species have been found in the Mud River upstream of the project area. These species were the plain pocket book (*Lampsilis cardium*), white heelsplitter (*Lasmigona complanata*), and pimpleback (*Quadrula pustulosa*). Reptiles and amphibians that may be found in this riverine habitat include common mud puppy (*Necturus maculosus maculosus*), northern green frog (*Rana clamitans melanota*), pickerel frog (*Rana palustris*), eastern snapping turtle (*Chelydra serpentina serpentina*), stinkpot (*Sternotherus odoratus*), painted turtle (*Chrysemys picta marginata*), common water snake (*Nerodia sipedon sipedon*),

and queen snake (*Regina septemvittata*). This area is also utilized by many of the same wildlife species that are found within BH habitats as well as by more aquatic species such as the river

otter (*Lutra canadensis*).

Stream Habitat: Two small tributaries travel through the project area on the north side of the Mud River. Johns Branch is located in the upper third of the project, while Newmanns Branch is located in the lower third. Both streams have been heavily channelized within the CWLs, and as a result do not provide high quality stream habitat. However, less alteration has occurred in their upstream reaches. These streams have steeper gradients than the Mud River and have small riffle-pool complexes. Both streams are bordered by steeper slopes to their west and are at least in portion bordered by MH habitat. Newmanns branch is bordered by immature BH near its' confluence with the Mud River. A number of other small unnamed streams occur throughout the project area creating a total of approximately 9,414 linear feet of jurisdictional stream habitat. This habitat may be useful for a number of benthic macroinvertebrates and should provide habitat for salamander species such as the Northern dusky salamander (*Desmognathus fuscus*), the Southern two-lined salamander (*Eurycea cirrigera*) and the spring salamander (*Gyrinophilus porphyriticus*). It will also be used as a water and food source by many of the wildlife species found in adjacent habitat areas.

Wetlands and other Unique Habitats: A large wetland complex exists on the north side of the river near the downstream terminus of the project. The main portion of this complex consists of a palustrine forested (PFO) wetland that is dominated by sycamore, box-elder, black willow, and river birch. Water purslane (*Ludwigia palustris*) is common in the herbaceous layer. At least 3.35 acres of this habitat type occurs within the Construction Work Limits (CWL), however this wetland continues south of the CWL and this portion of the wetland was not delineated. A 0.27 acre scrub-shrub (PSS) wetland occurs just northwest of the PFO wetland. Dominant vegetation in this area consisted of buttonbush (*Cephalanthus occidentalis*), swamp rose mallow (*Hibiscus palustris*), and arrow-leaved tearthumb (*Polygonum sagittatum*). Song sparrow, junco, cardinals, chickadees, red-winged blackbird (*Agelaius phoeniceus*), and common flicker (*Colaptes auratus*) were seen in this area. Amphibians such as red-spotted newt (*Notophthalmus viridescens viridescens*), Jefferson salamander (*Ambystoma jeffersonianum*), marbled salamander (*Ambystoma opacum*), northern spring peeper (*Pseudacris crucifer crucifer*), and wood frog (*Rana sylvatica*) may also occur.

Another wetland complex occurs on the south side of the river in the upper third of the project, south of the OA habitat used during the pumpkin festival. This low lying slew appears to be part of a remnant channel that follows a westerly-northwesterly meandering direction. The southern-most portion of this slew has been identified as a PFO/PSS wetland, that is dominated by sedges (*Carex intumescens*), Pennsylvania smartweed (*Polygonum pensylvanicum*), buttonbush, and brambles. The extent of this wetland was not delineated, however it is estimated that at least 10 acres occur. Although the northern end of this slew was not delineated as a jurisdictional wetland (it appears to have been plowed and mowed in the recent past), obvious differences in vegetation and topography are visually apparent. This area most likely forms an ephemeral pool that retains water during the spring or after high water events. Another area that has similar habitat characteristics occurs on the south side of the river, slightly northeast of the Mud River Road bridge. These areas are of special interest because they seem suited to support

populations of the Eastern spadefoot toad (*Scaphiopus holbrookii*). The Eastern spadefoot toad is relatively rare in the state, and has only been documented in 6 counties, including Cabell County. This species occurs in low-lying areas that retain water after heavy summer storms and requires loose sandy soils in which to burrow. This toad spends most of its time underground, and is active mainly at night when temperature and humidity are favorable.

Two other small PFO/PSS wetlands occur along Newmanns Branch. These areas total 0.56 acres and are dominated by box elder, buttonbush, black willow, curly dock (*Rumex crispus*) and blue-joint grass (*Calamagrostis canadensis*). A small, 1.3 acre parcel of black willow dominated habitat exists within the project area adjacent to the Mud River Road bridge. This area was not determined to be a jurisdictional wetlands, however it functions similar to a PSS wetland.

An open water habitat area occurs southeast of Milton Plaza that has been artificially created through the extraction of borrow and fill material. The area is at least seasonally inundated and maintains a hydrologic connection to the river. While a limited amount of vegetation was present within the open water area at the time of the HEP, aquatic vegetation may become more apparent during the growing season or may begin to colonize that area if disturbance is limited. Cattails (*Typha latifolia*), arrowhead (*Sagittaria latifolia*), and various species of sedges and rushes would be expected to occur. Even in the absence of aquatic vegetation, this area provides a suitable resting and nesting area for many species of waterfowl, such as mallard, Canada goose, and black duck, and may be utilized by other avian species such as red-winged black bird and great blue heron.

Endangered Species

Except for occasional transient species, the only Federally listed endangered species that could potentially be impacted by the currently proposed project is the Indiana bat (*Myotis sodalis*). This species may use the project area for foraging and roosting between April 1 and November 14. Indiana bat summer foraging habitats are generally defined as riparian, bottomland, or upland forest, and old fields or pastures with scattered trees. Roosting/maternity habitat consists primarily of live or dead hardwood tree species such as shagbark hickory, which have exfoliating bark that provides space for bats to roost between the bark and the bole of the tree. Tree cavities, crevices, splits, or hollow portions of tree boles and limbs also provide roost sites.

The nearest known hibernating populations are in Lawrence County, Ohio and in the Carter County Complex in Kentucky which is about 40 and 60 air miles from the project area, respectively. The Carter Cave Complex contains one of the largest known hibernacula for the species, including one Priority I, and two Priority III hibernacula. Priority I hibernacula have

populations of greater than 30,000 bats, while Priority III have populations of less than 500 bats. Bat Cave, within Carter County, Kentucky has been designated as Critical Habitat for the species. The Hibernacula within Lawrence County, Ohio is a Priority III area.

Recent data indicate that the area within an approximate 5.0 mile radius of a hibernaculum is important foraging and roosting habitat for the Indiana bat in the fall swarming period, August 15 through November 14. The project area is outside a five mile radius of a known hibernaculum. Therefore, fall-swarming behavior is not expected in the proposed project area, however foraging and maternity habitat may occur in the project area.

BASELINE FUTURE WITHOUT PROJECT ASSESSMENT

Aerial photography and maps of the project area from the 1960's to present were reviewed to determine what types of changes in land-use would be expected to occur in the project area in the future. The major change in land-use appears to be a conversion of agricultural areas into commercial development along the north side of the river. In particular, Milton Plaza was constructed on an area that was previously agricultural fields. The open water area at the upstream end of the project appears to have been constructed by borrowing fill material from areas adjacent to the river to raise the elevation of developable areas adjacent to Route 60. The racetrack area has also recently been converted from farm fields. However, most of the changes in land-use appear to be concentrated near Route 60 and have not occurred along the river, probably due to the risk of flooding. Most of the remaining agricultural habitat within project area is either at low elevations that are extremely susceptible to flooding (less than 572.9 MSL) or are associated with schools, parks, or festival areas that are unlikely to be developed in the near future. Disturbances to forested habitat such as periodic cutting seems to be consistent over time, however the available acreage of these habitat types does not appear to have decreased over time.

Approximately 10 acres of habitat within the project area is currently used for sewage treatment lagoons. It is anticipated that the Town of Milton will update their treatment system and divert this sewage into a more modern treatment system, negating the need for these ponds. The pond would most likely then be filled and developed in some manner. As a result this acreage will most likely become developed commercially within the planning period for the project. However, since this area is not currently impacted by the proposed construction, other than by increased flood heights, no changes to the Future Without Project (FWOP) have resulted. If project plans change, this area may need to be considered. Overall, little change in land-use patterns have occurred over the past 30 years, and under the FWOP scenario, it is not anticipated that this trend would change significantly in the future. Based on this review, the FWOP projections will be the same as the existing baseline conditions.

DESCRIPTION OF IMPACTS AND COMPARISON OF ALTERNATIVES

In order to calculate project impacts, designs for each alternative were overlayed onto habitat

maps using GIS. The acreage of impact for each habitat area, as determined by corresponding HEP sample site was then calculated. Appendix I provides a more detail on these calculations. Table 3, below, shows an overview of the impacts that each alternative will have to each habitat type. Alternative B would consistently have greater impacts to all terrestrial and aquatic habitat types present within the project area, including Waters of the United States, then would Alternative D.

Table 3: Comparison of Alternatives and Recommended Mitigation

Habitat Type	Alternative B Acres Impacted	HU	Alternative D Acres Impacted	HU
<i>Terrestrial Habitats</i>				
BLH	18.43	13.1	11.71	8.3
HW	3.16	1.9	3.17	2.0
OA	21.17	13.4	18.52	11.6
Subtotal	42.76	28.38	33.40	21.9
<i>Unique Habitat Areas</i>				
Open Water	3.68	2.6	0	0.0
Black Willow Area ¹	0.11	0.33	0.01	0.03
Low Swale ¹	4	8.0	3.27	6.54
Subtotal	7.79	10.99	3.28	6.57
<i>Waters of the U.S.</i>				
PFO ²	1.9	5.7	1.76	5.3
Riverine/Stream ³	4.14	NA	0.6	NA
Subtotal	6.04	5.7	2.36	5.3
Total Acres of Impact for Mitigation	56.59		38.97	

I. HU provided for these habitat types is recommended based on State 401 Certification ratios for similar

wetland habitats. Recommendations may be revised based on additional field work and interagency consultation.

2. HU for this habitat type is required acres of mitigation as per State 401 Certification (at a 3:1 ratio)

3. Mitigation for this habitat type would be based on linear feet of impact + a functional assessment

Riverine :The major difference between alternatives is the impact associated with relocating a portion of the Mud River. All Channel Relocation Alternatives would impact 3,225 feet of the Mud River. Alternative D, as well as the other Levee Only Alternatives would avoid this impact altogether. While using natural stream channel design techniques may help to reduce the impacts associated with channel relocation, avoidance of impacts is the preferred approach. Existing regulations, policies, and guidelines associated with the Clean Water Act such as the Guidelines for Specification and Disposal Sites for Dredged or Fill Material (Federal register 45:249, December 24, 1980) and the Service's Mitigation Policy (Federal Register 46:15, January 23, 1981) specify that if a feasible alternative exists that will avoid impacts to Waters of the United States, that alternative should be selected over other alternatives. This means that leaving the existing channel intact is necessarily preferred over any relocation alternative, even if the relocation is done in an ecologically sensitive manner. Given that the Corps has identified three feasible Levee Only alternatives that would avoid significant impacts to the Mud River, the Service strongly recommends selection of one of those alternatives.

Terrestrial: Based on mapping done by the Corps, it is estimated that Alternative B, the High Level Levee with Channel Relocation, will impact approximately a total of 69.9 acres as a result of project construction. This includes 18.43 acres of BH habitat, 21.17 acres of OA habitat, and 13.27 acres of Ur habitat. The remaining affected acreage is wetland or aquatic habitat. Alternative D, the Low Level Levee only alternative will impact approximately 55.05 acres, including 11.64 acres of BH, 18.52 acres of OA, and 16.08 acres of Ur habitats.

All Channel Relocation Alternatives would create a 13.3 acre pond over the existing BH area behind the pumpkin festival area and a 3,225 foot reach of river. The BH habitat that would be impacted is the largest contiguous area of BH within the project area. This area was also given one of the highest HEP ratings for this habitat type. The ponding area was therefore placed in a location that would have one of the greatest possible adverse impacts to wildlife resources. The area upstream and adjacent to Johns Branch is currently undeveloped and has been excavated to form an open water area. Utilizing this area for ponding purposes, as planned for Alternatives E - Medium Level Levee, and Alternative F - Very High Level Levee would be reduce impacts to BH habitats and avoid the impacts associated with relocating the river.

This same BH area is proposed to be used as a borrow area under Alternative D, and the other Levee Only Alternatives. The impacts under these alternatives are less then those incurred under the Channel Relocation Alternatives, and these impacts could be minimized by revising the configuration of the borrow site to avoid this area to the maximum extent practicable. This would result in more of the OA habitat near the pumpkin festival area being disturbed. However, OA habitats are by their nature easier to mitigate for then BH habitats. Mitigating for

BH habitat involves the cost and time of planting trees and allowing them to mature, while agricultural plants are designed to grow quickly and are easily planted and maintained.

Wetlands and Other Unique Habitats: Consistent with the impacts associated with other types of habitats, Alternative D would have reduced impacts to the unique habitats present within the project area. Alternative D would avoid impacts to the open water area altogether, while Alternative B would impact 3.68 acres. The other Levee Only Alternatives would also impact this area but to a lesser degree than under Alternative B or any other Channel Relocation Alternative. Similarly, although all alternatives would impact the PFO wetland near the downstream terminus of the project, the low lying swale habitats and the black willow area, the Channel Relocation Alternatives would cause the greatest losses.

Streams: Under all alternatives it appears that approximately 1000 feet of Newmanns Branch would be channelized between Rt 60 and the river. However, more opportunity exists for reconstruction of a ecologically beneficial stream confluence and channel under Alternative D, because the levee would be located farther away from river. Four additional jurisdictional but unnamed stream habitats might be impacted under the Channel Relocation Alternatives, while three might be affected under the Levee Only Alternatives. Adverse effects could be caused by reaches upstream of the levee being ponded or redirected, and areas downstream of the levee losing their hydrologic source or being channelized. A potential total of 2,445 feet of unnamed jurisdictional streams could be affected under the Levee Only Alternatives. While 3,777 linear feet has the potential to be impacted under the Channel Relocation Alternatives.

Preliminary project plans indicated that 2,200 feet of Newmanns Branch and 1,600 feet of Johns Branch that are upstream of Rt 60 would be used as a backwater ponding area during periods of flooding. However no information is available at the time this DCAR was drafted that would indicate how often this was to occur or to what depth this area would be flooded. Increased inundation of this area could cause increased mortality of vegetation adjacent to the stream, and affect soils and stream banks by increasing erosion. While the Service does not recommend that measures to address this issue be considered at this time, it is recommended that the Corps develop additional information on the anticipated frequency and depth of ponding that would occur in this area prior to issuing a Final EIS.

Endangered Species - Indiana bat: The Service has determined that suitable foraging and roosting habitat for the Indiana bat occurs within the project area. One option the Corps has is to conduct mist nest surveys prior to initiating project construction. A survey plan should be submitted to the Service for review and concurrence prior to conducting the survey. The survey should follow the standard Indiana bat mist net protocol from the Draft Indiana Bat Recovery Plan, and be conducted between May 15 and August 15 by a qualified mammalogist with experience in identifying Indiana bats. The results of these surveys should also be submitted to the Service for review and concurrence.

If Indiana bats are collected, the data should be incorporated into a Biological Assessment pursuant to Section 7 of the ESA. Biological Assessments are designed to assist Federal

agencies in determining if formal consultation is required. The Service recommends that the following steps be taken in preparation of the BA.

1. Conduct recent interviews of recognized experts on the species at issue, including those within the Service, WVDNR, U.S. Forest Service, universities and others who may have data not yet found in scientific literature.
2. Review up to date literature and other scientific data to determine the species distribution, habitat needs, and other biological requirements.
3. Analyze the effects of the action on individuals and populations of the species and its habitat, including indirect and cumulative effects of the action.
4. Analyze alternative actions that may provide conservation measures.
5. Conduct any studies necessary to fulfill the requirements of (1) through (4) above.
6. Review any other relevant information.

If you determine that the proposed action “may affect” a federally listed species you must request, in writing, formal consultation with this office, pursuant to Section 7(a) of the ESA. If the determination is “no effect”, no further consultation is necessary, unless requested by the Service. Regardless of your findings, the Corps should provide this office a copy of the survey results and any other relevant information that assisted you in reaching your conclusion.

Another option the Corps may use to address Indiana bat concerns is to assume Indiana bats are present and schedule timber removal operations during the hibernation period, between November 15 and March 31. If that option is chosen, the Corps must then submit a calculation of the percentage of area of suitable summer Indiana bat habitat that would remain within a two-mile radius (from the approximate center point of the proposed project area) after the proposed disturbance. If the Service determines that the extent of disturbance is significant and may affect the Indiana bat, the Corps must request formal Section 7 consultation with the Service or conduct mist net surveys to determine if Indiana bats are present. If Indiana bats are collected during mist netting, the Corps must prepare a Biological Assessment, as described below.

Due to the proximity of the project area to one of the largest known Indiana bat hibernacula, and the lack of existing mist net data for this region, the Service recommends that the Corps conduct mist net surveys in the project area. Results of these surveys are considered valid for three years.

RECOMMENDED CONSERVATION, ENHANCEMENT, AND MITIGATION MEASURES

Because Alternative D, the Low Level Levee would have the least adverse impact on all

terrestrial and aquatic habitat types, the Service strongly recommends that this alternative be selected as the preferred approach. Selection of this alternative would significantly reduce the costs associated with developing required mitigation. Alternative E, the Medium Level Levee, would have slightly greater mitigation requirements, but would still have significantly less than any of the proposed Channel Relocation Alternatives. As stated above, Clean Water Act guidance and the Service's Mitigation Policy specify that compensatory mitigation should only be undertaken when all possible measures to avoid and minimize impacts have been implemented.

The Service's Mitigation Policy further specifies that on-site, in-kind mitigation is the preferred approach to rectify or compensate for unavoidable impacts. Consistent with Section 663 of the FWCA, any areas of land or water that are acquired for the primary purpose of the proposed project shall be made available for the conservation, maintenance, and improvement of wildlife resources and associated habitat. The costs of planning for and the construction of these measures should be considered an integral part of the costs of the proposed project. The Corps estimates that approximately 41 acres of habitat will be available for other uses once project construction is complete. This acreage should be used to the extent possible, to fulfill mitigation for project impacts. If additional habitat acreage is required it should be acquired in close proximity to the project and compliment the on-site effort.

Since a preferred alternative has not yet been selected, and project planning is still on-going, this DCAR does not contain detailed mitigation designs, however the following information should provide a conceptual guideline. After a preferred alternative that is acceptable to all agencies is selected, more concrete mitigation plans should be developed under consultation between the Corps and the resource agencies. The mitigation recommendations contained in this report based on the results of additional field work or if project plans are redefined.

Terrestrial Impacts: As shown in Table 3, 21.9 Habitat Units (HU) of mitigation for terrestrial impacts would be required for Alternative D. The majority of these, 11.6 HU, would be associated with OA habitat. Alternative B would require a total of 28.38 terrestrial HU. The amount of HU associated with BH and OA habitats are almost equal, at 13.1 and 13.4 HU, respectively. Mitigation for Ur habitats is generally not recommended.

For these calculations, one HU is equal to an acre of habitat with a HSI rating of 10, meaning ideal habitat conditions exist for that type. Credit for HU of mitigation can be gained by creating by enhancing or restoring existing habitat. Under this approach, credit is given for the improvement of the resulting habitat over and above the existing or baseline habitat condition. For example, 10 acres of existing BH habitat with a current HSI rating of 5.0 would provide 5 HU. If that area is permanently protected so that large den trees are allowed to develop, and additional mast tree are planted, then potentially 10 acres of habitat with a HSI of 10 would be created, for a total of 10 HU. Thus, 5 HU of mitigation credit would be obtained. It should be noted that, since perfect 10 HSI scores are extremely difficult to obtain, under normal situations that amount of credit obtained would be less than provided for in this hypothetical example. Credit could also be obtained by preserving existing habitat. The amount of credit obtained

under this approach would need to be established by consensus of all agencies and would vary based on the quality of habitat preserved.

Based on this approach, all lands acquired for the project that are not permanently affected by the footprint of the levee should be developed or enhanced to benefit wildlife resources. Any project lands riverward of the levee should be enhanced to the extent possible to form a riparian border of BH. Existing BH habitats could be widened, additional trees could be planted, and restrictive covenants placed so that trees would not be cut. Borrow areas could be graded and planted with vegetation to form a mixture of BH, PFO wetlands, ephemeral pools, and open water habitat. Mitigation costs associated with Alternative D could be reduced by altering the configuration of the proposed borrow area to avoid high quality BH habitats, and preferentially impact additional OA habitat.

Because OA habitat adjacent to the project area is highly susceptible to development, conservation easements or other protective restrictions should be placed on remaining OA land, including the areas to the north and south of the river near the downstream terminus of the project. This would allow agricultural practices and existing habitat values to be maintained.

Mitigation for all habitat types should involve development of target conditions that describe the characteristics to be achieved within the mitigation area. Target conditions will help to quantify the benefits that will occur, and could include parameters such as species diversity, percent cover, DBH of trees, or lack of disturbance. After mitigative features are constructed, periodic monitoring should occur to ensure that mitigation objectives are being met. Any contract issued for construction of the project should incorporate environmental conservation measures that the contractor should comply with during construction. Limits to the amount of clearing, sediment and erosion control measures, and restrictions in the nature and timing of instream work should be included.

Wetland Impacts: All alternatives would impact at least 1.76 acres of PFO wetland. Due to the difficulty associated with recreating this type of wetland, and the time required for trees to reach maturity and provide target habitat functions, State 401 Water Quality Certification requires a mitigation ratio of 3:1 for PFO habitats. As shown in Table 3, 5.7 acres of mitigated PFO wetland would need to be created under Alternative B. Alternative D would require 5.3 acres. The Corps should investigate the possibility of minimizing impacts to this habitat type by moving the levee northward to the maximum extent possible without impacting additional structures.

OA and BH habitat areas surrounding the PFO wetland were given the highest HEP rating of all the sample points in those habitat types. The wildlife values for this area are enhanced by the diversity of habitats that are in close proximity to each other, as well as by the low level of disturbance. Under the Future with Project scenario HSI values for adjacent habitats would most likely go down. In addition, any wetland areas north of the levee would most likely be disturbed during construction and subsequently filled and developed once they are no longer subject to flooding. Much of the land that would remain riverward of the levee, is at a low lying elevation (572.9 MSL) that is well suited to support wetlands. Mitigation for PFO wetland habitat or other

habitat types could be accomplished adjacent to or within this area, and diversity of habitats and the resulting high HSI values would be maintained. Additional high quality EO and BH exist directly across the river. Given the existing high quality of this area, the Service recommends that the Corps incorporate preservation of this area on both sides of the river, into project designs.

Unique Habitat Area Impacts: Both alternatives would impact the low lying swale areas within the pumpkin festival field. This habitat may function as an ephemeral pool during periods of heavy rains and provides many similar functions and values as a wetland. As a result of these factors, the Service recommends that this habitat type be given special consideration during mitigation, particularly in relation to its potential to support the spadefoot toad. The Service recommends that these areas be surveyed for spadefoot toads prior to release of the Final EIS. In addition, mitigation plans should incorporate creation of low lying areas with loose soils that ephemerally retain water. We recommend that these habitats be mitigated on a 2 to 1 ratio similar to that suggested for Palustrine Emergent (PEM) wetlands. Mitigation could be accomplished within the soil borrow areas, and remaining undisturbed swale areas could be enlarged and planted with PEM vegetation. Depending on engineering requirements, the ponding areas for Johns Branch may also provide potential mitigation opportunities.

Black Willow Area: A small, 1.3 acre parcel of this habitat type exists within the project area adjacent to the Mud River Bridge. This habitat may be minimally impacted (approximately 0.11 acre) by Alternative B. Less than 0.01 acres of this habitat would be impacted under Alternative D. The habitat functions provided by this area are similar to a PSS wetlands, which are normally mitigated on a 3:1 ratio. Incorporating plantings of black willow cuttings along the river, or on the fringes of the borrow or ponding areas would adequately mitigate for this lost habitat.

Open Water: This area has been artificially created and is therefore not a jurisdictional wetland. However, it does provide many of the same functions and is heavily used by waterfowl. Habitat quality is lessened by frequent disturbance, lack of vegetation, and potentially poor water quality. Mitigation for impacts to this area could be accomplished through enhancing the remaining open water. Vegetated buffers and aquatic vegetation, including species that are known to improve water quality, could be planted in and around this habitat area. Additional open water acreage could be created in the soil borrow areas or potentially in the ponding areas for Johns Branch, depending on the engineering requirements of that feature.

Ponding Areas: Under all alternatives, a 2 acre ponding area for Newmanns Branch would be created within the flood protection area over what is now the racetrack. Under any of the Channel Relocation Alternatives, an additional 13.3 acre ponding area for Johns Branch would be constructed. If at all possible, ponding areas should be constructed in manner that would allow vegetation to become established and be should be low maintenance. Liners that would require replacement, and riprap that would require spraying or other methods of vegetation control, should be avoided. The Corps should consider planting vegetative buffer zones around these areas, and creating openwater or PEM wetland habitats within the ponds. These habitat types are compatible with occasional ponding associated with high flooding levels.

The Corps should develop additional information on the anticipated frequency and depth of ponding that would occur in the upstream backwater areas within Newmanns and Johns Branch prior to issuing a Final EIS. If the frequency and severity of ponding is significant enough that it might cause increased erosion or mortality to existing vegetation, additional conservation measures should be implemented to address those damages. Potential options include supplementing existing vegetation with plantings of species that are tolerant of inundation, or conducting a review of existing bank stability and implementing bioengineering approaches to stabilize any existing problem areas as a preventative measure.

Stream Habitats: As acknowledged in the Corps' December 24, 2002, Regulatory Guidance Letter, mitigation for impacts to stream channels is often difficult to develop and construct. Avoidance of impacts should be pursued to the extent possible. The ultimate level of impact to streams within the CWL will depend on the care that is taken during planning and construction to avoid disturbance to the stream channel and associated hydrology. Development of Best Management Practices to be used around streams during construction would be beneficial. Alteration of stream channels should be limited to the minimum amount required for project construction, and should not be done in areas that will not be permanently affected by the project footprint. Stream crossings and culverts placed during construction should be removed and restored once construction is complete.

Two of the potentially impacted streams occur on the south side of the river near the pumpkin festival area. These streams have been channelized in past and therefore, have limited wildlife values. Restoration efforts such as re-creating meander patterns and installing structural features should be considered. The Corps should also evaluate the feasibility of constructing the borrow and ponding areas so that small channels would be established during normal flows. Additional coordination is needed to develop measures to address potential stream impacts.

Riverine Impacts: As noted above, mitigation for impacts to streams and rivers is difficult to accomplish, and avoidance of impacts is the preferred approach. If it is demonstrated that no feasible alternatives exist that would avoid or minimize impacts to the Mud River, then mitigation measures would need to be designed to address remaining impacts. Given the information provided to date, the Service does not have justification to select a Channel Relocation Alternative over a Levee Only Alternative. It is therefore pre-mature to develop detailed mitigation designs for the Channel Relocation alternatives. However, the following information has been provided to aide in project planning and alternative selection efforts.

Preliminary plans for all Channel Relocation Alternatives show that 3,225 linear feet of the Mud River would be relocated into 2,920 linear feet of new channel. This constitutes a loss of 305 feet of stream, in addition to the loss of functions that may occur when replacing natural channel with an artificial one. In order to address these losses, the restored channel should provide at a minimum the same functions and values as provided for in the existing channel, and the linear feet of stream should be replaced on a one to one basis. All features of the mitigation plan should be developed under consultation between the Corps and the resource agencies. The Service recommends the following approach based on the information contained in the Corps'

December 24, 2002 Regulatory Guidance Letter and State 401 Water Quality Certification Guidelines.

2. Conduct a Functional Assessment (FA) of the Mud River including the area that is proposed to be relocated and reference reaches. This FA would provide information regarding baseline and target conditions and would seek to quantify the characteristics of the existing Mud River, which would then be mimicked in a reconstructed channel, and/or restored in other areas of the river. Selected reference reaches should have similar channel patterns and profiles as found within the impacted reach, should have stable banks, and should be minimally disturbed.
2. Target conditions for the reconstructed reach, based on the FA, and performance standards to gauge compliance with the target conditions would then be developed. Any target conditions should be consistent with the existing characteristics of the Mud River. It is noted that Mud River is distinct habitat type in many regards and it would be inappropriate to conduct a FA that would rate the river in reference to an inconsistent habitat, such as those present in trout streams. The reconstructed channel would also need to be consistent with the existing characteristics of the Mud River. Riprap or large stone substrates, or target conditions that would create an unnatural preponderance of riffle habitat would be inappropriate. The reconstructed channel's pattern, dimension and profile should be consistent with the existing channel. Meander radius and spacing should be based on an analysis of existing reference reaches. Riparian habitat consisting of native trees, shrubs and herbaceous species should be established along the banks. Trees should be allowed to grow to full mature height, and overhanging vegetation should be encouraged. In addition, structural diversity should be established in the channel through the placement of woody debris and cover. The channel should be wide enough and banks should be sloped in a manner to allow the formation of mud flats and bars.
2. The channel should be constructed in a manner that would require little maintenance. Dredging, clearing, snagging, or spraying to control vegetation within the channel should be avoided. The new channel should be constructed prior to initiating any instream work in the existing channel, and the channel should be dewatered during low flow periods in a manner that would minimize the loss of aquatic life. In addition, disturbance in the habitat adjacent to the constructed channel should be complete and riparian vegetation should be planted and intact prior to diverting the river into the constructed channel.
2. Additional enhancement and/or preservation measures should be developed to address the loss of linear feet of riverine habitat, as well as any losses in functional values that can not be addressed in the relocated channel. These enhancement/preservation measures could include vegetative buffers that would restrict future encroachment of the river, installation of instream structures and/or bank stabilization measures outside of the impacted reach. Preservation and enhancement ratios would be developed based on the FA and concurrence of all parties.
2. A legal means to ensure that mitigative features are maintained in perpetuity should be

established.

2. Contingency plans would also need to be developed in case target conditions were not met. If, for example, the reconstructed channel were to become unstable, measures would need to be in place to ensure that the channel would be restored in a manner that was consistent with ecologically based goals. The Contingency Plan should identify additional mitigation measures would be undertaken if this was not possible, as well as the party responsible for implementing these measures.
2. Long-term monitoring of the reconstructed channel would be required to ensure that target conditions were met. Annual monitoring for a period of 5 to 10 years would be required, and should include requirements for monitoring after specified high-water events.
2. Financial assurances would need to be in place to ensure that funds were available to monitor the mitigation and to undertake any corrective measures to restore the channel in case target conditions were not met.

The Service recognizes that development of a mitigation plan as outlined above would be difficult, and it may not be possible to fully obtain the outlined mitigation goals. Failure of any reconstructed channel would be undesirable both an engineering and ecological standpoint. This further underscores problems that would be associated with selecting a Channel Relocation Alternative.

SUMMARY OF FINDINGS AND SERVICE POSITION

Based on the information provided to date, Alternative D, the Low Level Levee Only alternative, would have the least adverse impact on fish and wildlife resources, and would therefore be the Service's preferred alternative. This alternative would avoid impacts to the aquatic environment to the maximum extent possible, and minimize impacts to terrestrial habitat. Mitigation measures to rectify or compensate for unavoidable impacts can be designed using on-site, in-kind methods and would primarily utilize lands that will be purchased as part of the project purpose. If the measures recommended below are incorporated into the project, the Service would support selection of this alternative.

Alternative E, the Medium Level Levee Alternative would have slightly greater impacts to terrestrial habitats than Alternative D. However, the differences between the level of impact between these two alternatives appear to be relatively minor and on-site, in-kind mitigation options are available that would most likely compensate for those impacts. The Service would not object to selection of that alternative.

All alternatives that require channel relocation, including Alternative B, the High Level Levee

with Channel Relocation, would have significantly greater impacts on all terrestrial and aquatic habitat types, including Waters of the United States. Selection of these alternatives would not be consistent with Clean Water Act regulations or existing Service policy. Developing mitigation options for impacts to the Mud River would be complex and would entail significant cost. Adequate mitigation options may not be available or may require additional off-site effort. The Service therefore strongly recommends against selection of any of these alternatives.

The Service recommends that the following measures to avoid, minimize and mitigate for impacts should be incorporated into the project designs of any alternative selected.

2. To the extent possible mitigation should be accomplished on-site, and in-kind. Excess lands purchased as part of the primary project purpose should be used preferentially. Remaining riparian zones should be enhanced and expanded. Borrow areas should be graded and planted to allow for establishment of wetlands, swales, and BH habitats. Ponding areas should be constructed to support vegetative buffers, and planted with vegetation tolerant of inundation. Stream channels should be maintained through these areas during normal flows. The existing open water area should be maintained and enhanced through plantings.
2. The existing OA, BH and EO habitats on both sides of the river near the downstream terminus of the project should be protected and enhanced through purchase or conservation easement.
2. Stream impacts should be avoided to the extent possible through careful project planning. Restoration of previously channelized streams in the pumpkin festival area should be incorporated in order to partially mitigate for stream losses. The Corps should coordinate with the WVDNR and the Service to develop appropriate measures to address stream impacts.
2. Project features should be designed to require minimal maintenance. The need for routine clearing or spraying of vegetation should be minimized. BMPs should be developed to ensure that impacts are minimized during construction.
2. Target conditions and monitoring protocols for all mitigated habitat types should be developed to ensure that mitigation objectives are successful.
2. Mist net surveys should be conducted to determine the presence or absence of Indiana bats. If Indiana bats are determined to be present, additional consultation under the ESA would be required.

The following additional measures should be incorporated into project designs if Alternative D, the Low Level Levee Only Alternative is selected. If another Levee Only Alternative is selected

similar measures would be recommended, although mitigation numbers would be slightly greater.

2. Terrestrial mitigation to produce 11.6 HU of OA habitat, 2 HU of HW habitat, and 8.3 HU of BH habitat should be developed.
2. A total of 5.3 acres of PFO wetlands, and 6.54 acres of low lying ephemeral pools or PEM type habitat should be created.
2. Impacts should be minimized by reconfiguring the proposed borrow area to preferentially impact OA habitat, and by moving the downstream terminus of the project northward, if all possible, to reduce impacts to PFO habitat.

The Corps has indicated that of the alternatives requiring channel relocation, Alternative B High Level Levee with Channel Relocation, provides the greatest economic benefit. Selection or support of this alternative would not be consistent with established Service policy, or existing Clean Water Act guidance. However, for planning and alternative evaluation purposes, the Service has determined that at a minimum, the following additional measures to minimize, rectify, reduce, and mitigate for project impacts should be incorporated into any designs for this project alternative. Similar measures would be recommended if another Channel Relocation Alternatives was selected.

2. Terrestrial mitigation to produce 13.4 HU of OA habitat, 1.9 HU of HW habitat, and 13.1 HU of BH habitat, should be developed.
2. A total of 5.7 acres of PFO wetlands, 8 acres of low lying ephemeral pools or PEM type habitat, and 0.33 acres of black willow habitat should be created.
2. Detailed mitigation plans to address impacts to the Mud River would need to be designed. This plan should incorporate a FA of existing conditions; creation of a channel that mimics existing characteristics of the Mud River - including riparian habitat, channel meanders, and instream structure; contingency plans and financial assurances in case mitigation fails; and long-term monitoring to ensure mitigative success.

This DCAR is based on the project information that was available as of March, 2003. The information presented in this report may be revised for the final CAR due to project alterations, receipt of additional project data, or further refinement of HEP methods. If any part of the described plans change the Service will re-evaluate the impacts and possibly modify our mitigation recommendations accordingly.

